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HOWREY & SIMON
Box No. 34
1299 Pennsylvania Avenue, N.W.
Washington, D.C. 20004-2402
(202) 783-0800

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Attorney Docket No. 06205.0027

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Sir:

Transmitted herewith for filing is the patent application of

Inventors: Inh-Seok SUH

For: Apparatus And Method for Controlling A Focus Position for A Digital Still Camera

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09/167539
10/07/98

Enclosed are:

- ☒ 4 sheets of informal drawings. (Figs. 1-4, inclusive)
- ☒ An assignment of the invention to SAMSUNG AEROSPACE INDUSTRIES, LTD.
- ☒ Form PTO-1595.
- ☐ A certified copy of KOREAN APPLICATION NO. 97-51339
- ☐ An associate power of attorney.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☐ Executed Power of Attorney from Assignee.
- ☐ Executed Declaration for Patent Application.

The filing fee has been calculated as shown below:

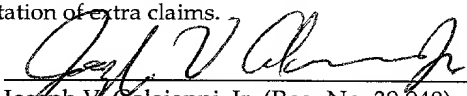
	(Col. 1)	(Col. 2)
FOR	NO. FILED	NO. EXTRA
BASIC FEE		
TOTAL CLAIMS	19 -20 =	* 0
INDEP. CLAIMS	3 -3 =	* 0
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENTED		

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RATE	FEE		RATE	FEE
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 - ☐ Any filing fees under 37 CFR 1.16 for presentation of extra claims.

Date October 7, 1998


Joseph V. Colaianni, Jr. (Reg. No. 39,948)

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HOWREY & SIMON

October 7, 1998

Attorneys at Law
1299 Pennsylvania Ave., NW
Washington, DC 20004-2402
(202) 783-0800
FAX (202) 383-6610

Box Patent Application

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Assistant Commissioner for Patents
Washington, D.C. 20231

jc542 U.S. PTO
09/167539
10/07/98

Re: U.S. Non-Provisional Utility Patent Application
Appl. No.: To Be Assigned; Filed: October 7, 1998
For: **Apparatus And Method for Controlling A Focus
Position for A Digital Still Camera**
Inventors: Inh-Seok SUH
Our Ref: 06205.0027

Sir:

The following documents are forwarded herewith for appropriate action by the
U.S. Patent and Trademark Office:

1. U.S. Utility Patent Application entitled:
**Apparatus And Method for Controlling A Focus
Position for A Digital Still Camera**

and naming as inventor(s):
Inh-Seok SUH

the application consisting of:

- a. a specification containing:
 - (i) 8 pages of description prior to the claims;
 - (ii) 5 pages of claims (19 claims); and
 - (iii) a one (1) page abstract;
- b. 4 sheets of drawings: (Figures 1 – 4, inclusive);
- c. a copy of the executed Assignment to Samsung Aerospace Industries, Ltd., recordation of which is hereby respectfully requested;

d. our check no. 166098 for \$830.00 to cover:

\$ 790.00 filing fee for patent application;
\$ 40.00 assignment recordation fee; and

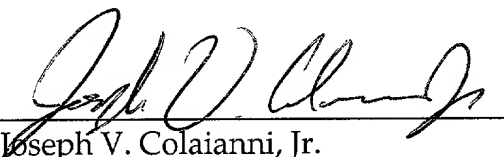
2. Utility Patent Application Transmittal Form;
3. Fee Transmittal Form 1082 (duplicate); and
4. two (2) return postcards.

It is respectfully requested that, of the two attached postcards, one be stamped with the filing date of these documents and returned to our courier, and the other, prepaid postcard, be stamped with the filing date and unofficial application number and returned as soon as possible.

Applicant hereby claims foreign priority benefits under Title 35, United States Code, § 119 to Korean Application No. 97-51339 filed on October 7, 1997.

The U.S. Patent and Trademark Office is hereby authorized to charge any fee deficiency, or credit any overpayment, to our Deposit Account No. 08-3038. A duplicate copy of this letter is enclosed.

Respectfully submitted,



Joseph V. Colaianni, Jr.
Registration No. 39,948

Enclosures

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APPARATUS AND METHOD FOR CONTROLLING A FOCUS POSITION FOR A DIGITAL STILL CAMERA

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to an apparatus and a method for controlling a focus position for a digital still camera, and more particularly, to an apparatus and method for controlling a focus position for a digital still camera, which allows a user to move a focus to a desirable position on a subject.

Description of the Prior Arts

10 A conventional digital still camera is a device which uses an electronic sensor such as a charge coupled device (CCD), to capture an image; a digital camera processor (DCP) to convert analog image signals from the CCD into digital image signals; a storage device to store the digital image signals; and a liquid crystal display
15 (LCD) to display the digital image signals.

 Conventionally, an autofocus system of a digital camera utilizing image signals of DCP in focusing marks a focus position on an LCD. The mark is fixed at the center of the LCD and a user should locate a subject to be focused at the center of the LCD and take a photograph.

20 Therefore, even when the subject to be focused is not located at the center of the frame, the camera assumes that the center of the frame needs to be focused and has the real subject intended to be focused be out of focus.

SUMMARY OF THE INVENTION

It is an objective of the present invention to provide an apparatus and a method for controlling a focus position for a digital still camera. It is also an object of the present invention to provide an apparatus and a method for moving a focus position to a desirable position of a subject.

To achieve the objective and in accordance with the purpose of the invention, as embodied and broadly described herein, the invention comprises a display unit for displaying an image corresponding to a subject and a mark representing a focus position, a switch unit for moving the mark on the display unit according to a user's request. The invention further comprises a focus controller for controlling focus on the mark displayed on the display unit.

Also, to achieve this objective, the present invention comprises the steps of determining whether a user inputs a movement of the focus position, displaying the inputted focus position when the user inputs a movement of the focus position, focusing on the position of a subject corresponding to the displayed focus position.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate one embodiment of the invention and, together with the description, serve to explain the principles of the invention. In the drawings:

FIG. 1 is a block diagram of a digital still camera in accordance with a preferred embodiment of the present invention;

FIG. 2 is a flowchart showing the operation for controlling a focus position for a digital still camera in accordance with a preferred embodiment of the present invention;

FIG. 3 is a diagram showing the movement of the mark displayed on the LCD;

FIG. 4 is a flowchart showing the operation of the focusing process subroutine
5 called in the main routine of FIG. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the preferred embodiment of the present invention, an example of which is illustrated in the accompanying drawings.

As shown in FIG. 1, a digital still camera comprises a lens/lens driving unit 10
10 generating an image by collecting light from the subject, a photoelectric converting unit
20 for generating electric signals corresponding to the image generated by the lens/lens
driving unit 10, a switch unit 30 established on the camera body for moving a focus
position and for starting photographing according to a user's selection, an LCD unit 40
for displaying the image. The switch unit 30 comprises arrow keys or a joy stick. The
15 LCD unit 40 comprises a LCD screen 42 for displaying the image and a touch screen
44 for moving the focus position according to the user's selection. The active area of
the LCD screen 42 is covered by the touch screen 44. The apparatus further
comprises a frame memory unit 50 for storing image data, and a flash memory card unit
60 for storing a compressed image data, an image signal processing unit 70 for
20 generating image data by processing the electric signals generated from the
photoelectric converting unit 20, for storing the image data in the frame memory unit 50,

and for displaying the image data on the LCD screen 42. The apparatus additionally comprises a focus control unit 80 that moves a focus position according to the user's selection through the switch unit 30 or the touch screen 44 and displays the relocated focus position on the LCD unit 40 by controlling the image signal processing unit 70.

5 The focus control unit 80 generates a value of the focus position by processing the image data stored in the frame memory unit 50 corresponding to the relocated focus position and focuses the new subject by controlling the lens/lens driving unit 10 according to the value of the focus position. The focus control unit 80 also compresses the image data stored in the frame memory unit 50 when the user selects to photograph
10 via the switch unit 30, and stores the compressed image data in the flash memory card unit 60 by the image signal processing unit 70. Further, the focus control unit 80 restores the compressed image data in the flash memory card unit 60 and stores the frame memory unit 50 as needed. The digital still camera comprises a release switch(not shown) for taking a photograph. The release switch operates at two phases.
15 The camera executes the operation of a focusing process at the first phase of the release switch. If further pressed, the camera executes the operation of storing an image of the subject at the second phase of the release switch.

As shown in FIG. 3, a mark 100 represents the focus position of the LCD unit 40. The mark 100 is located at the center of the LCD unit 40 early when the camera
20 turns on. Then, an initial focus position is on the center of the image displayed on the LCD unit 40. If a user moves the mark 100 using the switch unit 30 or the touch screen 44, the user can move the focus position anywhere on the image displayed on the LCD

unit 40.

Now, referring to FIGs. 1, 2, 3 and 4, the operation of the apparatus for controlling a focus position for a digital still camera in accordance with a preferred embodiment of the present invention will be explained.

At step S1, a user faces the lens/lens driving unit 10 of the digital still camera to a subject after the camera is turned on. Then, the lens/lens driving unit 10 forms an image of the subject. The photoelectric converting unit 20 generates electric signals corresponding to the image formed by the lens/lens driving unit 10 and transmits the signals to the image signal processing unit 70, which generates image data corresponding to the signals. Then, the image signal processing unit 70 stores the image data in the frame memory unit 50 and transmits the image data to the LCD unit 40 to displays the image.

Next, at step S2, the user views a picture in the LCD unit 40. The mark 100 is on a car located at the center of the LCD unit 40 and initially the car located at the center of the LCD unit 40 is focused. A user can move the focus position by using the switch unit 30 that has arrow keys or a joy stick or the touch screen 44 without changing the frame and composition of the picture. The user may relocate the mark 100 through the switch unit 30 or the touch screen 44 to a non-center position of the LCD unit 40, for example, to a person of Fig. 3. Accordingly, the final picture will be focused on the person.

If the user relocates the mark 100 through the switch unit 30 or the touch screen 44, the focus control unit 80 controls the image signal processing unit 70 in

order to display the relocated mark 100 on the LCD unit 40, at step S3. Next, at step S4, the focus control unit 80 checks the state of release switch. If the release switch is at the first phase, then the operation goes to step S5, where the image signal processing unit 70 stores the image data of the subject in the frame memory unit 50 and transmits the image data to the LCD unit 40 to displays the image. Next, at step S6, the focus control unit 80 calculates an address of the frame memory unit 50 corresponding to coordinates of the mark 100 displayed on the LCD unit 40. Image data corresponding to the position of the mark 100 are stored in the calculated address of the frame memory unit 50. At step S7, the focus control unit 80 controls the image signal processing unit 70 to read the image data stored in the calculated address of the frame memory unit 50. Next, the image signal processing unit 70 processes the image data in order to focus the lens 10. Then, the focus control unit 80 generates a focus value using the processed image data, at step S8

At step S9, the focusing process subroutine is executed. Referring to FIG. 4, the operation of the focusing process subroutine at step S9 will be explained.

At step S71, the image signal processing unit has the focus control unit 80 advance the lens 10 by one focusing step. At step S72, the focus control unit 80 generates a present focus value. Next, at step S73, the focus control unit 80 determines whether the present focus value is larger than the prior focus value generated at step S8. If the present focus value is larger than the prior focus value, then steps S71 and S72 are repeated. However, if the present focus value is not larger than the prior focus value, then the operation proceeds to step S74.

At step S74, the focus control unit 80 determines whether the present focus value is smaller than the prior focus value. If the present focus value is smaller than the prior focus value, then the operation goes to step S75, where the focus control unit 80 backs the lens 10 by one focusing step. Next, step S72 and S73 are repeated.

5 However, if the present focus value is not smaller than the prior focus value, that is, if a maximum focus value is found, then the operation proceeds to step S76.

At step S76, the focus control unit 80 fixes the lens 10. Next, the focus control unit 80 turns on an autofocus LED(light emitting diode) which signifies a completion of the focusing process.

10 Consequently, at step S9, the focus control unit 80 focuses on the person by controlling the lens/lens driving unit 10 according to the calculation for focus adjustment. Accordingly, the person is focused corresponding to the mark 100 as displayed on the LCD unit 40.

Next, the focus control unit 80 determines whether the state of the release switch is at the second phase, at step S10. If the state of the release switch is at the second phase, then the picture is taken, at step S11. The picture is taken as follows. The focus control unit 80 compresses the image data stored in the frame memory unit 50. Next, the image signal processing unit 70 stores the compressed data in the flash memory card unit 60. Consequently, the data stored in the flash memory card unit 60 is
20 photographic image data of the subject.

As described above, since a user can relocate a focus point to a desirable position of a subject, a user can take a picture having a certain position focused without

changing the frame or composition of the picture.

Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope and spirit of the invention being indicated by the following claims.

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WHAT IS CLAIMED IS:

1. An apparatus for controlling a focus position, comprising:
a display unit for displaying an image corresponding to a subject and a mark
representing the focus position;

5 a switch unit for moving said mark on said display unit; and
a focus control unit for controlling to focus on a position of the subject
corresponding to said mark.

10 2. The apparatus of claim 1, wherein said display unit comprises
a display screen that shows said image and said mark, and
wherein said switch unit comprises a touch screen that is used for moving said
mark, positioned upon said display screen.

15 3. The apparatus of claim 1, wherein said switch unit comprises a device
that is used for moving said mark.

20 4. The apparatus of claim 1, wherein said focus control unit further
calculates the focus position by processing image data corresponding to said mark
moved by said switch unit in order to focus the position of subject corresponding to said
mark.

5. A digital still camera, comprising:
a display unit that shows an image corresponding to a subject and a mark
representing the focus position;
a first image storage unit that stores image data corresponding to said image;
5 a switch unit that moves said mark on said display unit; and
a focus control unit that controls the focus on a position of the subject
corresponding to said mark.

6. The digital still camera of claim 5, further comprising a release switch
10 for beginning to taking a photograph, and wherein said focus control unit stores the
image data in said first image storage unit when the state of the release switch is at a
first phase.

7. The digital still camera of claim 5, wherein said display unit comprises a
15 display screen that shows said image and said mark, and
wherein said switch unit comprises a touch screen that is able to move said
mark, positioned upon said display screen.

8. The digital still camera of claim 5, wherein said switch unit comprises a
20 device that is able to move said mark and is established on the camera body.

9. The digital still camera of claim 6, further comprising a second image storage unit for storing compressed data .

10. The digital still camera of claim 9, wherein said focus control unit
5 compresses image data stored in said first image storage unit and restores compressed image data stored in said second image storage unit.

11. The digital still camera of claim 5, wherein said focus control unit further calculates the focus position by processing said image data corresponding to said mark
10 moved by said switch unit in order to focus the position of a photographic subject corresponding to said mark according to the focus position calculation.

12. The digital still camera of claim 11, wherein said focus position is calculated by processing image data stored in said first image storage unit
15 corresponding to said mark.

13. The digital still camera of claim 11, further comprising a third image storage unit for storing compressed data.

20 14. The digital still camera of claim 13, wherein said focus control means compresses image data stored in said first image storage unit and restores compressed

image data stored in said third image storage unit.

15. A method for a digital still camera operator to control a focus position of the camera, comprising the steps of:

- 5 (a) displaying a focus position;
- (b) determining whether the operator relocates the focus position;
- (c) displaying a new focus position when the operator relocates the focus position; and
- (d) focusing the lens corresponding to said relocated focus position.

16. The method of claim 15, further comprising the step of:
storing image data corresponding to a photographic subject, prior to
determining whether the operator relocates the focus position.

17. The method of claim 15, wherein said focusing step (d) further
comprises the sub-step of:
calculating said focus position by processing image data corresponding to said
relocated focus position.

18. The method of claim 17, further comprising the step of :
storing image data corresponding to a photographic subject, prior to

determining whether the operator relocates the focus position.

19. The method of claim 17, wherein said calculating step further comprises the sub-steps of:

5 generating an address of a memory storing image data corresponding to a coordinates of said relocated focus position;

reading image data stored in said address; and

calculating the focus position by processing said read image data.

ABSTRACT OF THE DISCLOSURE

An apparatus for controlling a focus position for a digital still camera allows a user to take a picture with a certain focused position by moving a focus to a desirable position of the subject. The apparatus comprises a display unit for displaying an image
5 corresponding to a mark representing the focus position, a switch unit and a touch screen for moving the mark on the display unit. The touch screen covers an active area of the display unit. The apparatus further comprises a focus controller for controlling to focus on a position of the subject corresponding the mark moved by the switch or the touch screen.

FIG. 1

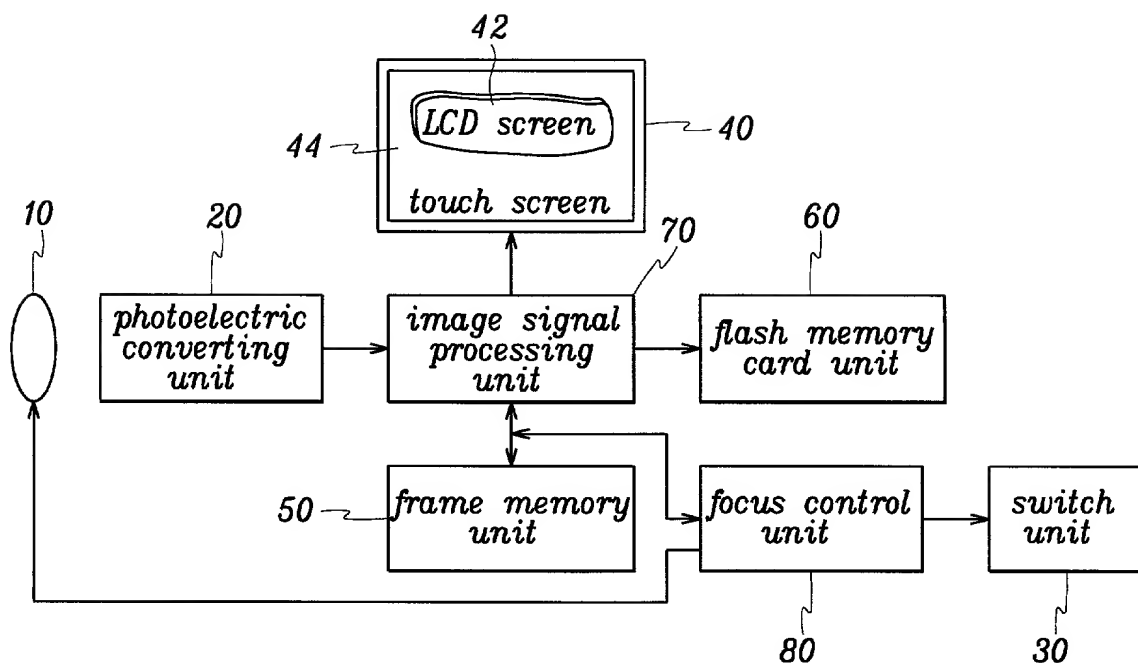
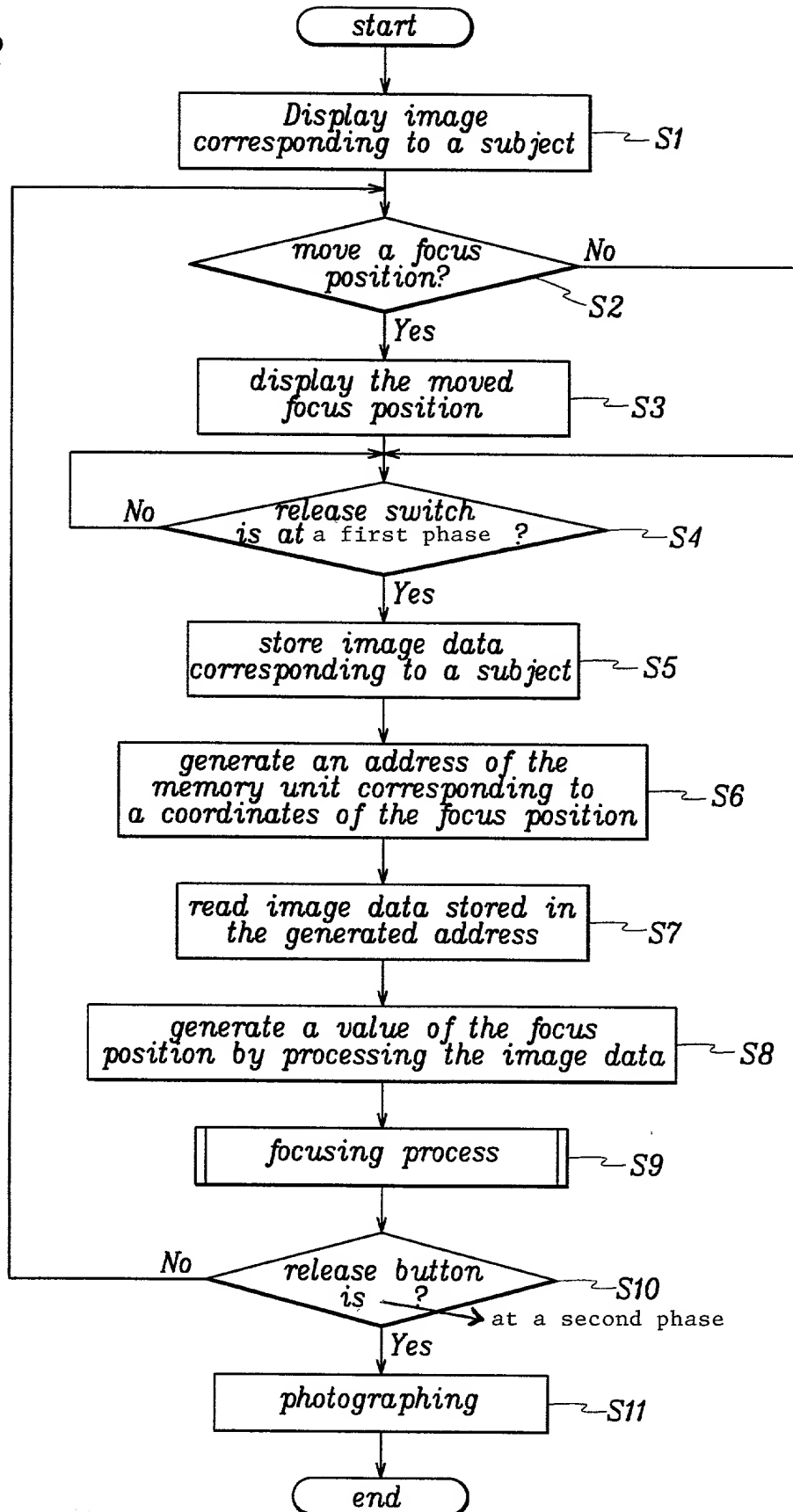


FIG. 2



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FIG. 3

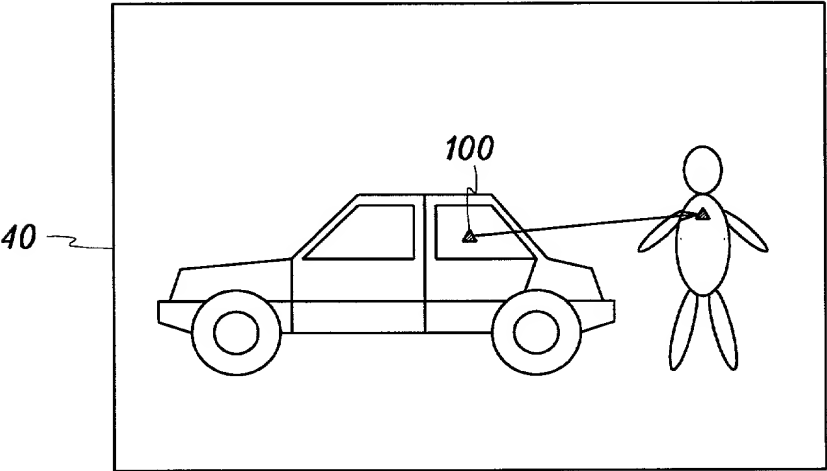


FIG. 4

